

van Lengerich - Serial No. 09/233,443  
Amendment and Summary of  
Interview with the Examiner

Lengerich, for "Encapsulation of Sensitive Liquid Components Into A Matrix To Obtain Discrete Shelf-Stable Particles".

**IN THE CLAIMS:**

Please amend claims 25 and 28, as shown in clean form:

25. (Amended) An encapsulated product obtained by the method of claim 1 wherein said encapsulant is at least one member selected from the group consisting of: acepromazine, acetaminophen, acetohexamide, acetohydroxamic acid, acetylcholine, acetylcysteine, acyclovir, albendazole, alclometasone dipropionate, allopurinol, alprazolam, alprostadil, amcinoide, amantadine, amdinocillin, amikacin, amiloride, aminocaproic acid, aminophylline, aminosalicylate , aminosalicylic acid, amitriptyline hydrochloride, ammonium chloride, amobarbital, amodiaquine hydrochloride, amoxapine, amoxicillin, amphetamine sulfate, amphotericin, ampicillin, amprolium, acetazolamide, acetyldigoxin, acetylsalicylic acid, anileridine, anthraline, antipyrine, antivenin, apomorphine, apraclonidine, ascorbic acid, acromycin, atropine, amoxycillin, anipamil, azaperone, azatadine maleate, azathioprine, azithromycin, aztreonam, bacampicillin, bacitracin, baclofen, beclomethasone dipropionate, belladonna extract, bendroflumethiazide, benoxinate hydrochloride, benzethonium chloride, benzocaine, benzonatate, benzthiazide, benztropine mesylate, betain, betamethasone, betaxolol,

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betanechol chloride, biotin, biperiden, bisacodyl, bismuth, botulism antitoxin,  
bromocriptine mesylate, bromodiphenhydramine hydrochloride, bumetanide, bupivacaine,  
busulfan, butabarbital sodium, butalbital, combinations of butalbital, caffeine, aspirin and  
codeine, beta-carotene, calcifediol, calcium carbonate, calcium citrate, candicidin,  
captopril, carbachol, carbamazepine, carbenicillin indanyl sodium, carbidopa,  
carbinoxamine maleate, carboprost tromethamine, carboxymethylcellulose, carisoprodol,  
casanthranol, cascara, castor oil, cefaclor, cefadroxil, cefamandole, cefazolin, cefixime,  
cefoperazone, cefotaxime, cefprozil, ceftazidime, cefuroxime axetil, cephalexin,  
cephradine, chlorambucil, chloramphenicol, chlordiazepoxide, chloroquine phosphate,  
chlormadinone acetate, chlorothiazide, chlorpheniramine maleate, chloroxylenol,  
chlorpromazin, chlorpropamide, chlorprothixene, chlorprothixene, chlortetracycline  
bisulfate, chlortetracycline hydrochloride, chlorthalidone, chlorzoxazone, cholecalciferol,  
cholera vaccine, chromic chloride, chymotrypsin, cimetidine, cinoxazin, cinoxate,  
ciprofloxacin, cisplatin, clarithromycin, clavulanate potassium, clemastine fumarate,  
elidinium bromide, clindamycin hydrochloride, -palmitate and -phosphate, clioquinol,  
clofazimine, clofibrate, clomiphene citrate, clonazepam, cinnarizine, clonidine  
hydrochloride, clorsulon, clotrimazole, cloxacillin sodium, cyanocobalamin, cocaine,  
coccidioidin, cod liver oil, codeine, colchicine, colestipol, corticotropin, cortisone acetate,  
cyclacillin, cyclizine hydrochloride, cyclobenzaprine hydrochloride, cyclophosphamide,

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cycloserine, cyclosporine, cyproheptadine hydrochloride, cysteine hydrochloride, danazol, dapsone, dehydrocholic acid, demeclocycline, desipramine, desoximetasone, desoxycorticosterone acetate, dexamethasone, dexchlorpheniramine maleate, Dexpanthenol, dextroamphetamine, dextromethorphan, diazepam, diazoxide, dibucaine, dichlorphenamide, dicloxacillin sodium, dicyclomine, dienestrol, diethylpropion hydrochloride, diethylstilbestrol, diflunisal, digitalis, dicoumarol, digitoxin, digoxin, dihydroergotamine, dihydrostreptomycin, dihydrotachysterol, dihydroxyaluminium aminoacetate, dihydroxyaluminium sodium carbonate, diltiazem hydrochloride, dimenhydrinate, dimercaprol, diphenhydramine hydrochloride, diphenoxylate hydrochloride, diphtheria antitoxin, dipyridamole, disopyramide phosphate, disulfiram, dobutamine hydrochloride, docusate calcium, docusate sodium, dopamine hydrochloride, doxepin hydrochloride, doxycycline, doxycycline hyclate, doxylamine succinate, dronabinol, droperidol, drotaverine, dydrogesterone, dyphylline, guaifenesin, enalapril maleate, analaprilat, ephedrine, epinephrine, equilin, ergocalciferol, ergoloid mesylates, ergonovine maleate, ergotamine tartrate, erythrityl tetranitrate, erythromycin, estradiol, estriol, estrogen, estrone, estropipate, ethacrynic acid, ethambutol hydrochloride, ethchlorvynol, ethinyl estradiol, ethionamide, ethopropazine hydrochloride, ethotoxin, ethynodiol diacetate, etidronate disodium, etoposide, eugenol, famotidine, fenoprofen, ferrous fumamate, ferrous gluconate, ferrous sulfate, flucytosine, fludrocortisone acetate,

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flunisolide, fluocinolone acetonide, fluocinonide, fluorescein sodium, fluorometolone,  
fluorouracil, fluoxymesterone, fluphenazine, flurandrenolide, flurazepam, flurbiprofen,  
folic acid, furazolidone, flunitrazepam, furosemide, gemfibrozil, gentamicin, gentian  
violet, glutarate, glutethimide, glycopyrrolate, chorionic gonadotropin, gramicidin,  
griseofulvin, guaifenesin, guanabenz, guanadrel sulfate, halazone, haloperidol, haloprogin,  
halothane, heparin calcium, hepatitis virus vaccine, hetacillin potassium, hexylresorcinol,  
histamine phosphate, histidine, homatropine, histoplasmin, hydralazine hydrochloride,  
hydrochlorothiazide, hydrocodone bitartrate, hydrocortisone, hexobarbital,  
hydroflumethiazide, hydromorphone hydrochloride, hydroquinone, hydroxocobalamin,  
hydroxyamphetamine, hydroxychloroquine sulfate, hydroxyprogesterone caproate,  
hydroxyurea, hydroxine hydrochloride, hydroxine pamoate, hyoscyamine, hyoscyamine  
sulfate, ibuprofen, ifosfamide, imipramide, imipramide hydrochloride, indapamide,  
indomethacin, insulin, inulin, iocetamid, iodoquinol, iohexol, iopamidol, ipecac, ipodate  
calcium, ipodate sodium, isocarboxacid, isoetharine hydrochloride, isoflurane, isoniacid,  
isopropamide iodine, isoproterenol hydrochloride, isosorbide dinitrate, isotretinoin,  
isoxsuprine hydrochloride, kanamycin sulfate, ketoprofen, ketoconazole, labetalol  
hydrochloride, lanolin, leucine, leucovorin calcium, levamisole hydrochloride,  
levocarnithine, levodopa, levonorgestrel, levorphanol tartrate, levothyroxine sodium,  
lidocaine, lincomycin hydrochloride, lindane, liothyronine sodium, liotrix, lisinopril,

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lithium carbonate, loperamide hydrochloride, loracarbef, lonetil, lorazepam, lovastatin,  
loxapine, lysine, mafenide acetate, magaldrate, magnesium carbonate, magnesium  
chloride, magnesium gluconate, magnesium oxide, other magnesium salts, malathion,  
manganese salts, manganese, maprotiline hydrochloride, mazindol, measles virus vaccine,  
mebendazole, mebrofenin, mecamylamine hydrochloride, meclizine hydrochloride,  
meclocycline , meclofenamate sodium, medroxyprogesterone acetate, mefenamic acid,  
megestrol acetate, meglumine, melphalan, minitel sodium diphosphate, menadione,  
menotropine, meperidine, mephénytoin, mephobarbital, meprednisone, meprobamate,  
mercaptopurine, mesoridazine besylate, mestranol, metaproterenol sulfate, metaraminol  
bitartrate, methacycline hydrochloride, methadone hydrochloride, methamphetamine  
hydrochloride, methazolamide, methdilazine, methenamine, methicillin sodium,  
methimazole, methionine, methocarbamol, methotrexate, methoxsalen, methoxyflurane,  
methsuximide, methyclothiazide, methylbenzethonium chloride, methyldopa,  
methylergonovine maleate, methylphenidate hydrochloride, methylprednisolone,  
methyltestosterone, methysergide maleate, metoclopramide, metolazone, meoprolol  
tartrate, metronidazole, metyrapone, metyrosine, mexiletine hydrochloride, mexiletine  
hydrochloride, miconazole, minocycline hydrochloride, minoxidil, mitomycin, mitotane,  
molindone hydrochloride, monobenzone, morphine sulfate, mupirocin, medazepam,  
mefruside, methandrostenolone, methylsulfadiazine, nadolol, nafcillin, nafcillin sodium,

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nalidixic acid, nalorphine, naloxone, nandrolone decanoate, nandrolone phenpropionate, naproxen, natamycin, neomycin, neomycin sulfate, neostimine bromide, niacin, nitrofurantoin nalidixic acid, nifedipine, nitrazepam, nitrofurantoin, nitroglycerine, nitromerson, nizatidine, nonoxynol 9, norethindrone, norethindrone acetate, norfloxacin, norgestrel, nortriptyline hydrochloride, noscapine, novobiocin sodium, nystatin, opium, oxacillin sodium, oxamniquine, oxandrolone, oxazepam, oxprenolol hydrochloride, oxtriphylline, oxybenzone, oxybutynin chloride, oxycodone hydrochloride, oxycodone, oxymetazoline hydrochloride, oxymetholone, oxymorphone hydrochloride, oxyphenbutazone, oxytetracycline, padimate, pancreatin, pancrelipase, papain, panthenol, papaverin hydrochloride, parachlorophenol, paramethasone acetate, paregoric, paromomycin sulfate, penicillamine, penicillin, penicillin derivatives, pentaerythritol tetranitrate, pentazocine, pentazocine hydrochloride, pentazocine salts, pentobarbital sodium, perphenazine, pertussis, phenacetin, phenazopyridine hydrochloride, phendimetrazine tartrate, phenelzine sulfate, phenmetrazine hydrochloride, phenobarbital, phenophtalein, phenoxybenzamine hydrochloride, phentermine hydrochloride, phenylalanine, phenylbutazone, phenylephrine hydrochloride, phenylpropanolamine hydrochloride, physostigmine, phytonadione, pilocarpine , pimozide, pindolol, piperazine, piroxicam plicamycin, poliovirus vaccine inactivated, polycarbophil, polymyxin b sulfate, polythiazide, potassium chloride, potassium citrate,

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potassium gluconate, potassium iodide, potassium sodium tartrate, povidone iodine, pralidoxime chloride, pramoxine hydrochloride, pramezam, prazepam, praziquantel, prazosin hydrochloride, prazosin hydrochloride, prednisolone, prilocaine, primaquine, primidone, probenecid, probucol, procainamide hydrochloride, procaine hydrochloride, procarbazine hydrochloride, prochlorperazine, prochlorperazine maleate, procyclidine hydrochloride, progesterone, proline, promazine, promazine hydrochloride, promazine, promethazine, promethazine hydrochloride, propafenone hydrochloride, propantheline, proparacaine hydrochloride, propoxycaine hydrochloride, propoxyphene hydrochloride, propoxyphene napsylate, propanolol hydrochloride, propylidone, propylthiouracil, propylthiouracil, protriptyline hydrochloride, pseudoephedrine hydrochloride, pumice, pyrantel pamoate, pyrazinamide, pyrethrum extract, pyridostigmine bromide, pyridoxine hydrochloride, pyrilamine maleate, pyrimethamine, pyroxylin, pyrinium pamoate, phenacetin, phenytoin, prednisone, quinidine gluconate, quinidine sulfate, rabies vaccine, racepinephrine ranitidine, rauwolfia serpentina, resorcinol, ribavirin, riboflavin, rifampin, ritodrine, rubella virus vaccine, saccharin, saccharin sodium, salicylamide, salicylic acid, salsalata, scopolamine, secobarbital sodium, selenious acid, selenium sulfate, sennaserine, simethicone, sodium ascorbate, sodium bicarbonate, sodium fluoride, sodium gluconate, sodium iodide, sodium lactate, sodium nitrite, sodium ditroprusside, sodium salicylate, spironolactone, stannoziolol, streptomycin, sucralfate, sulfacetamide, sulfadiazine,

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reserpine, sulfadioxine, sulfamerazine, sulfamethazine, sulfamethizole, sulfamethoxazole, sulfamethoxydiazine, sulfapyridin, sulfasalazine, sulfaperin, sulfathiazole, sulfisoxazole, sulfipyrazone, sulindac, suprofen, stilains, tamoxifen citrate, temacepam, terbutaline sulfate, terfenadine, terpin, testolactone, testosterone, tolazamide, tolbutamide, tetracaine, tetracycline, tetrahydrocycline, theophylline, thiabendazole, thiamine hydrochloride, thiamine, thiamylal, thiethylperazine thimerosal, thioguanine, thioridazine hydrochloride, thistrepton, thiotepa, thiothixene, threonine, thyroid stimulating hormone, ticarcillin, timolol, tioconazole, titanium dioxide, tolazamide, tolbutamide, tolmetin, tolnaftate, trazodone hydrochloride, tretinoin, triacetin, triamcinolone, triamterene, triazolam, trichorfon, trichlormethiazide, trientine hydrochloride, trifluoperazine hydrochloride, triflupromazine, trihexyphenidyl hydrochloride, trimeprazine tartrate, trimethadione, trimethobenzamide hydrochloride, trimethoprim, trioxsalen, tripelennamine, triprolidine, trisulfapyrimidine, tropicamide, trypsin, tryptohan, tuberculin, tyloxapol, tyropanoate sodium, tyrosine, tyrothricin, thyrothricin bethamethasone, thiotic acid, sotalol, salbutamol, norfenefrine, silymarin, dihydroergotamine, buflomedil, etofibrate, indometacin, urea, valine, valproic acid, vancomycin hydrochloride, vasopressin, verapamil, vidarabine, vinblastine, vincristine, vitamins, warfarin, yellow fever vaccine, zinc acetate, zinc carbonate, zinc chloride, zinc gluconate, beta acetyl digoxin, piroxicam, haloperidol, isosorbide 5-mononitrate, amitriptylin, diclofenac, verapamil, pyritinol,

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nitrendipin, doxycycline, bromhexine, clonidine, fenofibrate, allopurinol, pirenzepine, levothyroxin, tamoxifen, metildigoxin, o-(beta-hydroxyethyl)-rutoside, propicillin, aciclovir mononitrate, paracetamol, naftidrofuryl, pentoxifylline, propafenone, acebutolol, L-thyroxin, tramadol, bromocriptine, loperamide, ketotifen, fenoterol, cadobesilate, propanolol, enalaprilhydrogen maleate, bezafibrate, gallopamil, xantinol nicotinate, digitoxin, flunitrazepam, bencyclane, dexapanthenol, pindolol, lorazepam, diltiazem, piracetam, phenoxyethylpenicillin, furosemide, bromazepam, flunarizin, erythromycin, metoclopramide, acemetacin, ranitidin, biperiden, metamizole, doxepin, dipotassium chloroazeprate, tetrazepam, estramustine phosphat, terbutaline, captopril, maprotiline, prazosin, atenolol, glibenclamide, cefaclor, etilfrine, cimetidine, hydromorphone, ibuprofen, primidone, clobazam, oxaceprol, medroxyprogesterone, flecainid, pyridoxal 5 phosphate glutaminat, hymecromone, etofylline clofibrate, vincamine, cinnarizine, diazepam, ketoprofen, flupentixol, molsimine, glibornuride, dimetinden, melperone, soquinolol, dihydrocodeine, clomethiazole, clemastine, glisoxepide, kallidinogenase, oxyfedrine, baclofen, carboxymethylcysteine, thioridazine, betahistine, L-tryptophan, muritol, bromelaine, prenylamine, salazosulfapyridine, astemizol, sulpiride, benzerazide, dibenzepine, miconazole, nystatin, ketoconazole, sodium picosulfate, coltyramine, gemfibrocil, rifampicin, fluocortolone, mexiletin, terfenadine, mucopolysaccharide polysulfade, triazolam, mianserin, tiaprofenic acid, amezinium metilsulfate, mefloquine,

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probucol, quinidine, carbamazepine, L-aspartate, penbutolol, piretanide, aescin, cyproterone, sodium valproinate, mebeverine, bisacodyl, 5-aminosalicylic acid, dihydralazine, phenprocoumon, amantadine, naproxen, carteolol, famotidine, methyldopa, auranofine, estriol, nadolol, levomepromazine, doxorubicin, medofenoxate, azathioprine, flutamide, norfloxacin, fendiline, and prajmalium bitartrate.

28. (Amended) A food composition comprising an encapsulated product obtained by the method of claim 1 which is selected from the group consisting of ready-to-eat breakfast cereals, snacks, soups, salads, cakes, cookies, crackers, ice creams, yogurts, puddings, custards, baby foods, medicinal foods, sports bars, and beverages.

Please add new claims 68-95:

68. A method according to claim 41, wherein the substantially non-plasticizable matrix component comprises a member selected from the group consisting of an at least substantially non-gelatinized starch, fiber, cellulose and hemi-cellulose.

69. A method as claimed in claim 41 wherein the liquid plasticizer content of said formable dough is from about 10% by weight to about 50% by weight, based upon the weight of the formable dough.

70. A method as claimed in claim 1 wherein the formable mixture is extruded

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through a die having multiple apertures, at a rate of extrudate per die area of less than about 5 kg/h per mm<sup>2</sup>.

71. A method as claimed in claim 70, wherein the rate of extrudate per die area is less than 3 kg/h per mm<sup>2</sup>.

72. A method as claimed in claim 71, wherein the rate of extrudate per die area is less than about 0.5 kg/h per mm<sup>2</sup>.

73. A method as claimed in claim 70, wherein the diameter of the apertures is from about 0.3 mm to about 5 mm.

74. A method as claimed in claim 73, wherein the diameter of the apertures is from about 0.5 mm to about 1 mm.

75. A method as claimed in claim 30 wherein the formable mixture is extruded through a die having multiple apertures to obtain an extrudate at a rate of extrudate per die area of less than about 5 kg/h per mm<sup>2</sup>.

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76. A method as claimed in claim 75, wherein the rate of extrudate per die area is less than 3 kg/h per mm<sup>2</sup>.

77. A method as claimed in claim 76, wherein the rate of extrudate per die area is less than about 0.5 kg/h per mm<sup>2</sup>.

78. A method as claimed in claim 75, wherein the diameter of the apertures is from about 0.3 mm to about 5 mm.

79. A method as claimed in claim 78, wherein the diameter of the apertures is from about 0.5 mm to about 1 mm.

80. A method as claimed in claim 41 wherein the formable mixture is extruded through a die having multiple apertures to obtain an extrudate at a rate of extrudate per die area of less than about 5 kg/h per mm<sup>2</sup>.

81. A method as claimed in claim 81, wherein the rate of extrudate per die area is less than 3 kg/h per mm<sup>2</sup>.

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82. A method as claimed in claim 82, wherein the rate of extrudate per die area is less than about 0.5 kg/h per mm<sup>2</sup>.

83. A method as claimed in claim 80, wherein the diameter of the apertures is from about 0.3 mm to about 5 mm.

84. A method as claimed in claim 83, wherein the diameter of the apertures is from about 0.5 mm to about 1 mm.

85. A method for encapsulating or embedding a component in a matrix comprising:

a. obtaining a formable mixture by admixing ingredients comprising at least one plasticizable matrix material, an encapsulant, a liquid plasticizer, and a substantially non-gelatinized starch, wherein said plasticizable matrix material is plasticizable by said liquid plasticizer at a temperature which does not substantially destroy said encapsulant, said admixing being under low shear and low temperature conditions to plasticize the plasticizable material without substantially destroying the encapsulant to obtain a substantially homogeneous plasticized, viscoelastic, formable mixture,

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b. forming said formable mixture into pieces by extruding the formable mixture through a die having multiple apertures at a rate of extrudate per die area of less than about 5 kg/h per mm<sup>2</sup>, and

c. drying said pieces.

86. A method as claimed in claim 1, wherein said liquid encapsulant component comprises at least one enzyme.

87. A method as claimed in claim 1, wherein the amount of said at least one plasticizable matrix material is at least about 30 % by weight based upon the weight of said dry pieces.

88. A method as claimed in claim 1 wherein said plasticizable matrix material which is admixed with said liquid encapsulant component is in solid form.

89. A method as claimed in claim 1 wherein said at least one plasticizable matrix material comprises at least one member selected from the group consisting of high gluten content flours, gluten from wheat, durum wheat, and durum semolina.

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90. A method as claimed in claim 30, wherein the amount of said at least one plasticizable matrix material is at least about 30 % by weight based upon the weight of said dry pieces.

91. A method as claimed in claim 41, wherein the amount of said at least one plasticizable matrix material is at least about 30 % by weight based upon the weight of said dry pieces.

92. A method as claimed in claim 41, wherein the substantially non-plasticizable matrix component comprises an at least substantially non-gelatinized starch.

93. A method as claimed in claim 41 wherein said at least one plasticizable matrix material comprises at least one member selected from the group consisting of high gluten content flours, gluten from wheat, durum wheat, and durum semolina.

94. A method as claimed in claim 41 wherein said at least one component for controlling the rate of release of the encapsulant comprises a protein.

95. A method as claimed in claim 41 wherein the pieces obtained by said drying

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are hardened, solidified, discrete particles and may be ground.